



Service Manual

G9190



Safety

Contents

Safety and Environment	1
Preface	1
Safety is related to everyone	1
Guidelines.....	3
Electromagnetic environment compatibility	3
Cab rollover protection structure (ROPS).....	3
Noise limitation.....	4
Safety during Handling of Machine	5
Some Simple Safety Rules	6
Before Operations	7
Seat belt.....	8
During running of engine	9
In event of rollover danger	10
Falling object.....	10
Towing and tow-start	10
Safety rules during repair and maintenance	11
Before any repair or maintenance work:	11
Maintenance position	12
Operation Safety of Tires	14
Air inflation.....	14
Installation of tire and wheel rim	15
Repair of tires and wheel rims	15
Operation Safety of Battery.....	16
Battery Charging	17
Start with Booster Battery	18
Handling Safety of Oils.....	19
Operation Safety of A/C Refrigerant.....	20
Personal protection devices.....	21
Measures in event of accident:.....	22

Operation Safety of Accumulator	23
Safety of Hydraulic System	24
Relief of pressure (Release of pressure)	25
Fire Prevention Measure.....	26
Cleanliness.....	27
Electric system.....	28
Welding and Grinding	28
Checking after Fire Accident or High Temperature.....	29
Health Hazard of Paints, Plastics, and Rubbers.....	30
Working on painted surfaces	30
Rubbers and plastics	31
Fluororubber	32
Environment	34
Waste Treatment	34
Engine oil and fluids.....	35
Chemicals	36
Rubbers and plastics	36
Electronic units	36
Works in contaminated environment.....	37
Decontamination after leakage/splashing.....	37
Decontamination after accidents	37

Safety and Environment

Preface

This manual is one part of the entire Maintenance Manual of G9190 Grader. Please carefully read the contents of this part.



Warning:

Make sure to firstly read the section “Safety” in the manual before the operations.

Safety is related to everyone

Always abide by the instructions of the Operation and Maintenance Manual of G9190 Grader attached in the machine. This manual is supplemental with the Operation and Maintenance Manual of G9190 Grader.

SDLG designs and manufactures safe and efficient machines. However, our endeavors will come to naught if the operator of our machines fails to carefully read or abide by the safety instructions, such as climbing up or down the slip machine parts without use of ladder, grasping the hoses instead of handrail, or use incorrect tools not intended for the specific operation.

To maintain the safe and effective functions of the machine, make sure to always use

appropriate spare parts designed especially for this machine (genuine parts from Shandong Lingong Construction Machinery Co., Ltd.). Our company (Shandong Lingong Construction Machinery Co., Ltd.) will not be liable for the damages of machine nor provide warranty compensation arising from the use of spare parts other than the genuine parts from Shandong Lingong Construction Machinery Co., Ltd.).

The working personnel shall bear the safety consciousness and fulfill the maintenances of machine, in order to ensure safety and effectiveness and bring in profit. If failing to abide by the safety operation instructions or pay attention to the “warnings” in this manual, the operator shall ensure that own operation method is safe and reliable. Otherwise, there is a danger of accident or even danger leading to injury accident.

Warning Symbol: 

This symbol appears along with the specific key points and warning texts in this manual and is intended for “Warning! Please be alerted of your life safety!”.

Guidelines

Electromagnetic environment compatibility

The electric devices on this machine will probably cause interference on other electric devices under certain conditions or will be interfered by external electromagnetic wave to cause safety problems.

Our machines have passed the special tests of electromagnetic wave interference. All other electric devices installed on this machine must pass the electromagnetic interference tests.

Cab rollover protection structure (ROPS)

It's prohibited to conduct any unauthorized modification on the rollover protection structure (ROPS), such as the reduction of roof height, drilling, welding on fire extinguisher bracket and radio antenna bracket or other device. The similar unauthorized modification will probably impair the strength of rollover protection structure (ROPS) and forfeit the conformity certificate. The rollover protection structure (ROPS) has passed the following test and met the requirements of ISO 3471. The roof of the cab has passed the strength test and met the falling object protection structure (FOPS)

requirements of ISO 3449.

All modification plans to the weight carrying structure of cab must be consulted with Shandong Lingong Construction Machinery Co., Ltd. in advance, in order to ensure that the qualified performances of the machine will not be impaired. One important point is that all personnel within your organization, including the management personnel, shall fully understand the relevant regulations of the rollover protection structure (ROPS). If anyone within your company finds out a modified machine without permission, your company should notify the customer and manufacturer in written of which machine and what type of modification.

Noise limitation

For the noise level load regulations at the driver seat, the vibration value of the driver seat is 1.22m/s² for the light-duty operator and 1.25m/s² for heavy-duty operator.

It's prohibited to modify or disassemble any material influencing the noise level, such as the sound insulation, sound reduction, and sound absorbing materials. In addition, it's prohibited to cut hole/opening in the cab or engine compartment, or it will increase the noise within the cab.

Safety during Handling of Machine

Shandong Lingong Construction Machinery Co., Ltd. is only liable for the following conditions:

- This machine is used and maintained correctly as per the instructions in Repair Manual of G9190 Grader and the Operation and Maintenance Manual of G9190 Grader.
- The specified maintenances and checking are fulfilled at specified intervals.
- The lubrication instructions of the machine specified in the manual are abode by.
- No safety seal is ever opened by non-authorized personnel.
- All maintenance and repair works are fulfilled as per the manners specified by our company (SDLG).
- Only the genuine parts/accessories or additional devices meeting the requirements of our company (SDLG) are used.



Warning:

The driver of the machine must sufficiently understand and master the contents of Operation and Maintenance

Manual of G9190 Grader before the operations of the machine.

It's of great importance for the driver to carefully read and abide by the instructions of Operation and Maintenance Manual of G9190 Grader.

It will lead to serious injury accidents if the machine is driven by non-trained personnel.

It's prohibited to operate the machine without Operation and Maintenance Manual of G9190 Grader

Understand the warning labels, symbols, and instructions on the machine before using the machine.

Some Simple Safety Rules

- All malfunctions or problems impairing the safety shall be resolved as soon as possible.
- Always wear the protective helmet, goggles, gloves, protective boots, and other safety equipment required for your works.
- Avoid standing in the front or rear side of the machine while the engine is running.
- While cleaning the outer side of the windows, always use long-shank rubber window scraper or brush, in order to prevent unnecessary climbing up or down the



Figure 1 Access of Machine

machine.

- Keep clean the foot plate surfaces, maintenance site, handrails, and anti-slip protective parts, without any engine oil, diesel, sludge, or ice/snow, and ensure the timely repair and replacement when such parts are damaged or lost.
- Periodically check all anti-slip protective parts for secure fixing. If not, take fixing measure or replace.
- Always face towards the machine and use the foot plates and handrails to climb up or down the machine. Always ensure 3-point contact, namely two hands + one foot or two feet + one hand. Do not jump up or down the machine.

Before Operations

Some important rules are as below:

- Implement all safety checking measures described in the Operation and Maintenance Manual of G9190 Grader.



Warning:

Do not drive the machine whenever you feel tired or are influenced by alcohol, medicine, or other drugs.

- Before starting the engine indoors, ensure the sufficient ventilation. This machine is fitted with one diesel engine and its exhaust



Figure 2 Reading Operation and Maintenance Manual of G9190 Grader before Operations of Machine

gas is harmful to your health. Therefore, ensure the sufficient ventilation. In event of insufficient ventilation, run the engine only when it's absolutely necessary.

- Before operations or conducting any repair or maintenance works on the machine, read all nameplates and instructions on the machine and the instructions in the Operation and Maintenance Manual of G9190 Grader. Every label contains important information related to safety, treatment method, and repair and maintenance.
- Fasten the seat belt in all operations.
- Always sit in the driver seat to start the engine.
- All functions must be intact and effective, namely all malfunctions probably leading to accidents are resolved, before putting the machine into operation.
- It's absolutely prohibited to use the machine without ventilation device for a long period nor operate within an completely enclosed cab without turning on the fan (in order to prevent hypoxia).

Seat belt

- If it's necessary to clean the seat belt, use mild soapy water, air dry under fully



Figure 3 Fastening Seat Belt during All Operations



Figure 4 Placing Control Lever at Neutral Position

stretched state, and then retract the seat belt.

Ensure the correct installation of the seat belt.

- If the seat belt is worn or is subject to force application during the accident of machine, immediately replace the seat belt.
- It's absolutely to modify the seat belt or its mounting parts.
- The seat belt is designed for one adult and not intended for use by multiple persons.
- The seat belt shall always be under retracted state when it's not in use.

During running of engine

- Pay attention to the warning lamps. In event of red warning lamp, immediately take measures or pay more attention. Please refer to the instructions in section "Instruments" of Operation and Maintenance Manual of G9190 Grader.
- Before leaving the machine, make sure to place the control levers and handles to neutral position. Shift the gearshift control lever to neutral gear.



Warning:

Risks of serious injuries.

- Do not stand near the frame joint, unless it's already locked by the frame joint lock.
- Before leaving the machine with machine

unattended, stop the engine.

In event of rollover danger

- This cab features the protection function for operator and conforms to the standard of rollover protection structure (ROPS). Please refer to the Guidelines - Cab Rollover Protection Structure for further descriptions. The precondition for the protection is that the seat belt is fastened by the operator. Therefore, hold tightly the steering wheel in event of rollover of this machine.



Warning:

Do not jump off the machine.

Falling object

- The structural sizes of this cab meet the requirements of cab falling object protection structure (FOPS).

Towing and tow-start

- Towing
If the grader is being towed, shift the gearshift control lever to neutral gear (N). If possible, run the engine so that the steering and brake assist device are still functional. If the grader is being towed by wire rope, it's prohibited for anyone to stay between the tractor and the grader.
- Tow-start

Because of the torque converter, it's impossible to start the grader by towing, as the tow-start will damage the transmission.

Safety rules during repair and maintenance

This part includes the general safety rules during checking and maintenance.

Other rules, consultation, and warning texts are provided in Operation and Maintenance of G9190 Grader.

Before any repair or maintenance work:

It's really dangerous to implement any repair or maintenance work incorrectly.

Ensure that you have sufficient knowledge, correct information, appropriate tools, and complete equipment to correctly fulfill the repair and maintenance works.

- If someone is to take over your repair works, ensure that the detailed work progress (namely how much has been fulfilled and how much is to be fulfilled) is provided.
- While cleaning the machine with high pressure water, do not point the nozzle directly to the anti-slip surface with anti-slip coating or labels affixed on the machine.



Warning:

Only use the special foot plate surfaces to



Figure 5 Wearing Labor Protective Devices

walk on the machine or climb up or down the machine. Please refer to Operation and Maintenance Manual of G9190 Grader.

- While working on the machine, do not wear loose articles that will be probably clamped on the machine, such as headscarf and jewelry, in order to prevent personal injuries.
- Always wear the protective helmet, goggles, gloves, protective boots, and other safety equipment required for your works.
- Always keep the engine stopped during the repair or maintenance of the machine, unless otherwise specified on the signal symbols and nameplate on this machine or in this publication.
- Stop the engine before opening the engine hood, radiator water tank, or similar part. Ensure that there is no tool or article that will probably cause damage left on the machine.
- Keep the engine hood closed during the running of the engine and the working of the machine.

Maintenance position

1. Park the machine on a horizontal and solid surface and place it at maintenance position,

as shown in the figure below.

2. Lower the working devices (blade and mouldboard) onto the ground.



Figure 6 Maintenance Position of Grader



Figure 7 Affixing of Warning Flag

3. Stop the engine, withdraw the ignition key, and pull up tightly the handbrake.
4. Affix the warning flag and fix the articulated steering mechanism of grader.
5. Securely support the working devices if it's necessary to hang them in the air.
6. It's prohibited to tighten the connectors in the system when the hydraulic system contains pressure.
7. Block the rolling of wheels, such as use of wedges.
8. Turn off the battery cutoff switch.
9. Cool down the machine



Warning

- If the pressure is not relieved before the opening of the system, the oil will spray

out under high pressure to cause serious personal injuries. Relieve the pressure from pressurized pipeline and oil tank, in order to prevent the safety accidents.

- If it's necessary to operate on the machine before it's cooled down, pay special attention to hot fluids and machine parts, in order to prevent scalding.

Operation Safety of Tires



Warning:

It will probably cause explosion and lead to serious injuries while inflating the tires installed on wheel rims.

Air inflation

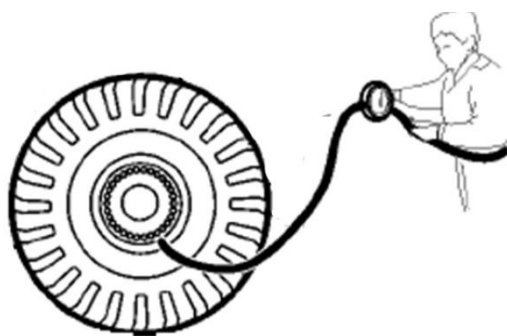


Figure 8 No Standing Near Tire during Air Inflating

- Do not stand on one side of the tire while inflating a tire installed on the wheel rim. During the air inflation, use one air cock capable of automatic locking and one long enough hose to keep you out of the danger zone.
- While inflating the tire, ensure that no one is standing within the danger zone.
- Make sure to check the tire pressure when the machine is under unloaded condition.
- If the pressure of one tire installed on the machine is less than 80% of the normal pressure and it's suspected that the wheel rim or tire is damaged, disassemble the tire

for air inflation.

Installation of tire and wheel rim

- Handle the tire only by trained technicians.
- If one tire clearly mismatches with one wheel rim, do not install the tire onto the wheel rim.
- Do not assemble the wheel rim parts of different sizes together nor use damaged or failed parts.
- Special cautions shall be taken while using the repaired wheel parts. Any failed or incorrect welding, heating, or fusion will probably impair the strength of parts and cause future malfunction.
- While installing tire on wheel rim, use the lubricant recommended by the tire manufacturer.

Repair of tires and wheel rims

- It's prohibited to cut, weld or heat the wheel parts by any means.
- Take cautions while using the wheel edge breaker and hydraulic jack. Keep out of the danger zone while disassembling foreign material from the tire. It's really dangerous while loosening the wheel edge breaker as it will probably cause serious personal injuries or death.

Operation Safety of Battery

The battery contains sulfuric acid, which is of corrosivity to the human bodies and machine parts. In addition, the battery will release hydrogen under loaded condition (as power supply) or during discharging. The hydrogen combines with the oxygen in the air to form explosive air mixture.

During all works related to the machine battery, the combination of explosive air mixture and corrosive sulfuric acid will greatly increase the danger of accident.

Therefore, during the operations of the battery, carefully read and abide by the following rules.



Warning:

Danger of serious corrosion!



Caution:

- The battery will release explosive gas. Do not smoke near the battery.
- While disassembling the battery, firstly cut off the grounding wire. To reduce the danger of fire accident due to fire spark, finally connect the grounding wire during the installation of battery.
- It's absolutely prohibited to tilt excessively a battery towards any direction. Otherwise, the battery



Figure 9 Corrosive Sulfuric Acid



Figure 10 No Open Fire

electrolyte will probably leak out.

- **Do not connect in series an excessively discharged battery with a fully charged battery, or there is a danger of explosion.**
- **Do not touch the wiring posts of battery with any metal object (such as tool, ring, and watch). Otherwise, there is a danger of fire accident and personal injury.**
- **While working near the battery, cover the top of the battery with a cloth or other non-conductive material.**
- **Always install the caps of battery wiring posts.**
- **The battery contains substances harmful to the health and environment. Therefore, the scrapped battery must be disposed as per the relevant local/national regulations. Please refer to the environment-friendly treatment methods.**

Battery Charging

The explosive hydroxide is formed during the charging of the battery. A short-circuit, open fire, or spark near the battery will cause powerful explosion. Before disconnecting the charging clamps, firstly cut off the charging current. Keep well ventilated, especially when the battery is being charged in an enclosed space.

**Warning:****Danger of serious corrosion!**

The battery electrolyte contains corrosive sulfuric acid. If the electrolyte is splashed onto exposed skin, flush away immediately. Use soapy water and a great amount of clean water to clean the affected area. If the electrolyte is splashed into eyes or any other sensitive body part, flush with a great amount of clean water and seek for medical treatment immediately.

Start with Booster Battery

To start with booster battery pack, make sure to abide by the following items:

**Caution:**

- **Check and ensure that the booster battery pack or any other power supply has same battery with the machine battery.**
- **If a fully charged battery is connected with a depleted battery, the battery will explode due to current surge. As the battery contains sulfuric acid, it will cause personal injuries.**

Abide by the following steps:

1. Open the engine hood.
2. Open the battery cover.
3. Turn off the battery cutoff switch.
4. Do not disconnect the cables of machine

battery.

5. Disassemble the caps from battery posts.
6. Connect the positive cable from the booster battery or other power supply to the positive wiring post of the left battery.
7. Connect the negative cable from the booster battery to the engine cylinder block.
8. Turn on the battery cutoff switch.
9. Use the ignition switch within cab to start the engine.
10. To charge by alternator, disassemble the jumper cable from the grounding point and negative post of booster battery and then disassemble the jumper cable between the positive wiring posts.
11. Restore the machine.

 **Caution:**

If the alternator fails to charge, stop the machine by switch and check for cause.

Handling Safety of Oils

 **Warning:**

Danger of scalding! Please wear protective gloves.

- While replacing the hydraulic oil, engine oil, or drive oil of the grader, bear in mind that the oil is really hot and will probably cause burn/scalding.

- The engine oil, hydraulic oil, diesel, and fuel in the grader is of corrosivity to the mucous membrane, such as eyes, throat, and skin. Therefore, pay special attention to keep these sensitive body parts away from engine oil.
- While vacuumizing or draining engine oil or fuel, take measures to avoid unnecessary splashing. In the place impossible to collect oil with a container, use a suction pump or connect a hose as safety measure. The careless drainage of engine oil or fuel is not only harmful to the environment, but also leads to fire accident.

The scrapped oils shall be disposed by authorized disposal company. Please refer to the environment-friendly treatment methods.

Operation Safety of A/C Refrigerant

Whenever it's necessary to break up the A/C system, the repair works and further works shall be fulfilled by the personnel with special qualification. Many countries also require special training and officially authoritative approval. Please understand and abide by the national administration rules.

★ Caution:

The refrigerant will increase the

greenhouse effect. Do not intentionally drain it to open air.

Personal protection devices

When there is a danger of skin contact with refrigerant, please use tight goggles and protective gloves and protect other naked skin (there is a danger of cold injury). The incorrect treatment will cause serious personal injuries and environment hazard by the refrigerant R134a. Therefore, pay special cautions during the operation of A/C unit. To prevent the injury for the personnel who might come into contact with refrigerant, the following rules will be of great help.



Figure 11 Wearing Goggles and Gloves in event of Contact Danger with Refrigerant



Warning:

- **The gases are smell-free and odor-free and will seriously damage the lung even under low concentration.**
- **Danger of cold injury! Please use protective gloves.**
- **The fluid refrigerant will cause cold injury.**
- **The low concentration gas refrigerant will have certain influence, especially on the nerve system.**
- **High concentration gas refrigerant has an anesthetic effect.**

- The A/C unit is of high pressure and the refrigerant will leak unintentionally. Do not disconnect the hose or disassemble the filler port cap from the compressor.
- If the leakage is suspected, please contact a person authorized by the service station for troubleshooting and repair.
- The smoking, welding, and other open fire are prohibited in the working site for handling of refrigerant. The refrigerant gas will combust and generate a toxic gas and the inhalation of such gas is really dangerous. The gas generated during the heating of the refrigeration has a pungent odor under high concentration.

Measures in event of accident:

Inhalation of refrigerant gas

Upon suspicion of escaped gas, please leave the suspected area, attempt to seek for fresh air, and transfer the affected personnel out of the danger area. A small amount of refrigerant vapor will have certain influence, especially on the nerve system. A great amount of refrigerant vapor will have anesthetic effect. Under serious conditions, seek for medical treatment immediately.

Skin irritation

In event of cold injury, flush with warm water for a long period. If the unprotected skin comes

into contact with a great amount of fluid refrigerant, carefully keep warm the injured area with warm water or cloth. If the symptom is sustained, seek for medical treatment immediately.

Splashing into eyes

Flush the eyes with warm water, till the irritation feeling disappears. Seek for medical treatment immediately.

Operation Safety of Accumulator



Warning:

- **The operations shall be fulfilled only by professional repair personnel.**
- **If the pressure is not relieved before the opening of the system, the oil will spray out under high pressure to cause serious personal injuries.**

Relieve the system pressure before disassembling the accumulator from the machine.

Some accumulators contain pressure, namely the so-called pre-charged pressure, even when they are disassembled from the machine. Therefore, take cautions during the handling of accumulator or operations on the accumulator.

The pre-charged pressure must be lowered to barometric pressure before taking any measure on the accumulator.

Avoid the exposure of accumulator under high pressure and avoid the brutal handling.

The scrapped accumulator must be pressure relieved before the crushing, in order to prevent explosion.

 **Warning:**

The scrapped accumulator without perforation probably still contains high pressure and shall be handled with care always.

Safety of Hydraulic System

The hydraulic system in the grader is running at extremely high pressure. To prevent serious personal injuries, it's of great importance to repair the system in a correct way, namely all personnel relevant to the machine shall be extremely careful during the operations and pay close attention to all defects.

To prevent accidents, please abide by the following regulations:

- Do not adjust the pressure limiting valve to a pressure higher than the level recommended by the manufacturer.
- Any expanded hydraulic hose (for instance: at the joint) indicates the immediate rupture of the hose and shall be replaced as soon as possible. Pay attention to the leakage of

hydraulic hoses and connections and repair before the rupture of parts.

**Warning:**

If the pressure is not relieved before the opening of the system, the oil will spray out under high pressure to cause serious personal injuries.

Relief of pressure (Release of pressure)

The system contains accumulated pressure after the engine is stopped. Before loosening or opening any hose connector or plug in hydraulic system or brake system, make sure to relieve the residual pressure in the system by pressure relief. When the engine is stopped, depress the brake valve repeatedly to relieve the pressure of accumulator.

- All pressurized oil tank/container shall be opened with care, in order to relieve any residual pressure.
- Check the leakage of pipe connectors and tightening state of connections only after the pressure of the system is completely relieved.
- Use steel plate or hard paper board, instead of hand, to check for leakage.

Fire Prevention Measure

Overview

- The fire extinguisher fitted on the machine must be maintained at functional state and is located on the left rear side of the cab.
- Even only there is a low fire, whenever the actual condition permits, bear in mind your personal safety and take the following measures:

1. Start the machine and drive away from fire or hazardous site.
2. Rotate the ignition key to position “0” to stop the engine.
3. Leave the cab.
4. Turn off the battery switch.
5. Start the fire extinguishing and when necessary call the fire department.

- The fire and smoking are prohibited in the vicinity of the machine while adding fuel to the machine or the fuel system is opened to come into contact with air.
- The diesel is an inflammable substance and can't be used for cleaning the machine. Use qualified detergent to clean the machine.
- Some detergents will probably cause fire or skin irritation. Avoid the inhalation of detergent vapor.



Figure 12 Fire Extinguisher

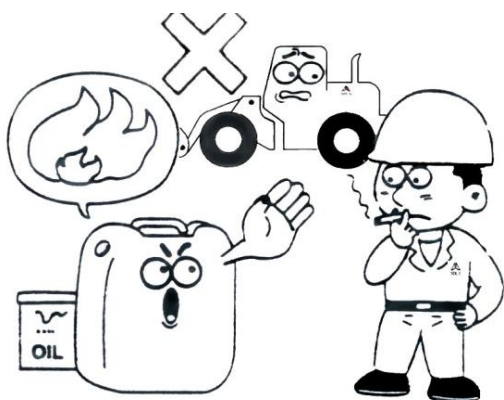


Figure 13 No Smoking during Refueling

Cleanliness

The cleanliness is the decisive factor for safe and reliable operations of all machine systems. Therefore, keep clean the repair and maintenance site. The engine oil and water will wet the ground and ladder. It will easily cause danger if the electric system contaminated with engine oil or water comes into contact with tools. The oily clothing or the clothing contaminated by lubricating grease is the hazardous substance leading to serious fire accident.

- Please daily check to ensure that the machine and devices are free of dust and oil dirt, such as the slide plate on the bottom of body. This can reduce the potential hazard for fire accident and help the detection of malfunctioned or loosened part easily.
- Special cautions shall be taken while using high pressure water for cleaning, as the electronic units and cable insulations will be damaged under relative moderate pressure and water temperature. Please properly protect the cables.
- During the working in the environment with fire danger, such as the lumber mill or waste disposal plant, pay special attention to maintaining the cleanliness. The appropriate devices (such as muffling baffle, radiator

shield, and high power air pre-cleaner) must be installed during working under such environment, in order to prevent the danger of spontaneous combustion due to accumulated materials.

Electric system

- Check the cables for presence of scratch and ensure that the cables are not damaged in that way. This is especially important for the wires without fuse.
- If the wires without fuse are ever broken, make sure to check whether the wires are reconnected and ensure that the connection mode can greatly reduce the scratching danger for the wires. Keep the wires without fuse away from engine oil or fuel hose.
- While installing any optional device, ensure that all wires are connected via fuse and the arrangement and fixing mode of wires can guard the wires against being scratched.

Welding and Grinding

During any electric welding works, the fire extinguisher must be easily accessible.

- The welding and grinding works can be conducted only in the clean portions of the machine and are prohibited in the portions containing inflammable fluid, such as the oil

tank and hydraulic pipe. Special cautions shall be taken when it's necessary to conduct welding and grinding at such portions.

- When it's necessary to weld at the painted surfaces, firstly remove the paint. The welding on painted surface will not only generate gas harmful to health, but also cause poor welding and even malfunction, which will finally lead to accident.
- Use personal protective devices. Whenever the actual condition permits, use an exhaust fan to exhaust the toxic gas generated during the welding and grinding.

Checking after Fire Accident or High Temperature

- As a preventative measure, the seal rings shall be always treated as fluororubber. In addition, please refer to the section "Fluororubber".



Warning:

Avoid the splashing of water while cleaning the machine burnt by fire. Therefore, do not use high pressure water for cleaning.

- Whenever it's possible to come into contact with melted polymer, do not touch the burnt unit or part directly with hand. Firstly clean

with a great amount of lime water (one calcium hydroxide solvent or suspension liquid, namely hydrated lime).

- Use thick protective gloves made of rubber and wear goggles to protect your eyes.
- If your skin probably comes into contact with burnt fluororubber, please seek for medical treatment. The skin shall be treated with hydrofluoric acid burn cream or similar medicine. The symptoms will probably appear after several hours from the contact of burnt fluororubber.
- Scrap the protective gloves, cloth, and other objects probably coming into contact with burnt fluororubber.
- Keep well ventilation during operations.
- If the eyes are irritated, flush with a great amount of clean water immediately for at least 15min and then seek for medical treatment.

Health Hazard of Paints, Plastics, and Rubbers

Working on painted surfaces

It's absolutely prohibited to use flame to weld or cut on painted surfaces. All paints will decompose when being heated to generate a great amount of different substances and the

repeated exposure in such environment will be very harmful to your health.

Make sure to take the following safety measures:

- Use sand paper to grind away an area of at least 10cm (4 inch) in radius around the welding point or cutting point (please use the respirator) on the painted surface. If the paint can't be ground away by sand paper, take other measures, such as paint remover.

 **Caution:**

If the paint is removed by paint remover, use an exhaust fan and wear the respirator and protective gloves.

- The grinding machine with high speed grinding disc can heat up the painted surface and shall be used only along with the use of an exhaust fan. In addition, wear the mask or other respirator.

Rubbers and plastics

 **Warning:**

The rubbers and plastics will release substances harmful to the health and environment when being heated. Make sure to abide by the following safety rules:

- If no heat insulation measure is taken in advance, do not weld or cut by flame gun near the polyester material (plastic or

rubber).

- Do not burn the polymeric materials while scraping them.
- Handle with care the machine after the fire or high temperature accident.
- Always wear gloves, goggles, and mask, or other respirator.

Fluororubber



Warning:

- **There is a danger of serious corrosion!**
- **When the hydrofluoric rubber is being heated, even only at approximate 320 °C (610 °F), it means the accumulation of hydrofluoric gas and the inhalation of such gas will seriously corrode the respiratory tract.**

Some seals are designed to resist high temperature (namely the seals in the engine, transmission, axle, brake, hydraulic motor, and pump) and manufactured by fluororubber, which will generate hydrogen fluoride and hydrofluoric acid when being heated to high temperature.

The hydrofluoric acid is of strong acidity and corrosivity. It can't be flushed or cleaned from skin and will cause extremely serious burns and corrosion injuries, which require long time for recovery. As general principles, the injured tissues must be removed by surgery.

The hydrofluoric acid will remain on the machine parts for a long time (several years) after fire accident.

If one machine or one machine part is subject to fire accident or other strong heat, it can be handled only by trained repair personnel.

The high strength rubber gloves and effective protective goggles shall be used for all operations on the machine after fire accident.

**Warning:**

The combustion of painted parts and plastic/rubber parts will cause harm to health.

Decontamination.

For the portions exposed to high temperature, if it's suspected that the parts affected are made of fluororubber, make sure to thoroughly flush with a great amount of lime water (one calcium hydroxide solvent or suspension liquid, namely water mixed with hydrated lime), in order to remove the toxic substances. At completion of the decontamination works, make sure to clean the gloves in the lime water and then scrap.

If the machine is exposed to fire accident or other high temperature source, the safety measures in the following checklist must be abode by unconditionally in all cases: Checking after Fire Accident or High Temperature.

Environment

For the future environment protection, the entire world is facing with the huge challenges of environment issues and the water cleanliness, weather variation, and use of chemicals have become the most important issues. The machines from Shandong Lingong Construction Machinery Co., Ltd. played own significant role against these challenges and made own contribution to the more environment-friendly development and the cautious utilization of natural resources.

Waste Treatment

Abide by the following steps during the treatment of wastes.

- Recycling: It's the best way from an environmental protection perspective.
- Material recycling: It's a good environment protection means to use recycled material in new products.
- Energy recovery: It's a good alternative method to burn the non-recyclable inflammable material as fuel.
- Disposal: This method can be used for hazardous wastes. The disposal must be conducted in special sites.
- Burial: It's a bad method from an



Figure 14 Recycling

environmental protection perspective and shall be avoided whenever possible.

- **Storage:** It's a temporary measure to treat the wastes until appropriate treatment technology is developed.

Always choose a method most appropriate to the environment protection, whenever a possibility is available, such as the use of biochemical engine oil.

Always abide by the national and local environmental protection regulations.

All wastes shall be submitted to the waste treatment firms authorized by authority for treatment.

Engine oil and fluids

The non-reusable engine oil or fluids (such as coolant) shall be collected by sealed containers and submitted to the disposal department for disposal.

Filters

The engine oil and fuel filters shall be fully drained, placed in sealed containers, and submitted to the disposal department for disposal.

Refrigerant

The refrigerant contains substances influencing the greenhouse effect and can't be exhausted into

open air. The repair personnel for treatment of refrigerant must understand the relevant local laws and regulations as well as the international regulations. It's recommended that the repair personnel for all repair works of the A/C must be trained. Many countries require that such works can be fulfilled only by those with certificate released by authority.

Engine oil and fuel

While draining the engine oil and fuel, take appropriate measure to prevent unnecessary splashing. In the place impossible to use drainage container, please use pump or hose.

Chemicals

The chemicals, paints, sealants, and detergents shall be treated or disposed by recycling department.

Rubbers and plastics

The rubber and plastic parts shall not be burned directly. Please submit to the recycling department.

The tires shall be treated as per special regulations.

Electronic units

The electric units and electronic wastes, such as circuit boards and bulbs, shall be submitted to the recycling department for disposal.

Works in contaminated environment

The machine working in contaminated environment/healthily harmful site shall be fitted with special device suitable for such environment.

After the working in the contaminated environment with asbestos or other toxic dust, the used cab and engine air filters must be placed in sealed plastic bag (the packaging bag of new filter) and submitted to disposal department for treatment.

Decontamination after leakage/splashing

Use appropriate absorbing material to collect the leaked engine oil or fuel, such as water absorbing pad.

Avoid the leaked engine oil/fuel from draining into sewage along with rainwater/flood.

The contaminated soil and ground materials must be removed and collected in appropriate containers.

The collected soil and absorbing materials shall be submitted to disposal department for treatment.

Decontamination after accidents

Whenever possible, seal the leakages on the machine.

Use water drainage railing to isolate the leakage site.

Add absorbing materials, such as water absorbing sands or wood chips.

Block the leakage fluid from draining into sewage or drain along with rainwater/flood.

Collect the absorbing materials and floating soil, place in sealed containers, and submit to disposal department.